[From the Proceedings of the Entomological Society of Philadelphia, Feb. 1863.]

Importance of INSECT ARCHITECTURE to Entomologists.

BY WILLIAM COUPER,

Assistant Secretary of the Literary and Historical Society, Quebec, &c.

That the study of forms constructed by the *Articulata* lead to the determination of the parent architects, is evident to every intelligent investigator of the insect world. Yet strange to say, I have not met with an Entomologist on this side of the Atlantic who specially devoted his leisure in collecting them. It cannot be said that it is for want of material that this neglect arises, for in Canada, I have collected upwards of six thousand specimens of both animal and vegetable structures formed by *larvæ*, or made use of by perfect insects to fulfill their ends.

A well arranged Cabinet of Insect Architecture presents a most charming picture to the lover of Nature — when these various and curious works of insects are brought together — then it is, that sensation and appreciation will be realized. It is at this stage that the Entomologist sees the real connective use of a collection of this nature with the Order of his study. A hasty glance over this accumulation of buildings erected by our little architects presents us the numerous and various shaped galls produced

by *Cynipidæ;* stems of plants exhibiting the labour of the parent insects in boring through the pith to form cells for their progeny. Plants, such as the *Conioselinum Canadensis*, the interior of the stem of which is occupied by hundreds of cocoons of a Moth. Leaves of plants rolled, curled, tented and mined by Caterpillars and Aphides. Cells of the various Hymenopterous insects; the beautiful little nests of wasps, some quite round, others pear-shaped, *the work of a single pair*. What a contrast between these little structures and the nest of the common Wasp, which is sometimes twelve inches in diameter. A wasp occurs in Western Canada that illustrates the constancy of specific work. This species generally selects a hole in a bank, such as would be left by the falling out of a round stone. The foundation is laid by a substance similar to that used by the common species; this is worked upwards for a short distance. They then procure a much whiter substance, and with it a second ring is formed of about three quarters of an inch wide. The nest is thus a continuation of white and brown rings, and from this peculiar instinct in the insect's mode of architecture, it is named *Vespa marginata*. Hymenopterous insects, also construct nests of mud and clay, laboring from day to day (in their season) until completion; and the species called hornet make use of the same kind of material that the cliff swallow selects to build its nest. The leaf-cutting Bee is provided with mandibles formed to cut circular pieces from leaves of plants, and often have I watched its dexterity and neatness of work. The collector of insect architecture may sometimes find under the bark of trees, three or four rolls of semi-decayed leaves, from one to two inches in length. —They are frequently placed side by side, and contain food on which the *larvæ* feed. The cells are not unlike a continuation of thimbles placed equidistant into each other. We also have the architectural labor of Ants in beautiful gallaries, supported by pillars and traverses on which generations of the insects move up and down in the decayed tree.

The tubular aquatic nests of the *larvæ* of Caddis-flies are subjects for an enquiring mind; some being formed of grains of sand, others of leaves and pieces of wood.

A Coleopterist is content when the *imago* is discovered, and after describing it, considers his part performed towards the advancement of human knowledge. Another goes further in delineating forms of *larvæ*, but their architecture, in all cases, whether the work of *larvæ* or of *imago* is altogether neglected. Can not beauty and design be seen in the cocoons of *Osmoderma scabra* and *Osmoderma eremicola?* When the egg-shaped cocoons of these pith-eating *larvæ* are examined, we perceive them formed of fine par-

ticles of ejectamenta with fragments of wood, which the insect cements together by means of a saliva; and these pretty structures are formed in total darkness in the interior of trees. Does not the *imago Canthon laevis* teach us a lesson in the mode by which it provides food for its progeny; and why should the globular structure be rejected by the Entomologist? It is no wonder that the ancient Egyptians worshipped its relative.

The *Modus operandi* of the *Cicadæ* may be familiar to Entomologists; we know that they deposit their *ova* in branches of fruit trees, and I find the *exuviæ* of the *nympha* state in forests, therefore, it is a nice investigation to determine the trees on which it is a parasite. What a pretty Collection the Lepidopterous Cocoons make of themselves? How many Students are there to day, who looks on the cocoons of this order as possessing interest?

The insects are all they care to make room for; large sums are expended to procure descriptive books, at the very time natures information is within reach. Little thinking that the *Chrysalis* covering formed by the Caterpillar reveals the genus to which it belongs. For instance, this year a young beginner rears the Caterpillar of *Attacus luna*, which forms its cocoon, and in due time he procures the *imago*. Next year, he finds a Caterpillar of *Attacus polyphemus*, which, although a cogener, differs from the former in form and markings. It also spins a like cocoon in size and texture, and in this way, our young beginner discovers that he is the possessor of two species of a genus. In Lepidoptera a remarkable analogy appears in the cocoons of every species of a genus; and we discover a difference between generic forms throughout the order. Hence, I am of the opinion that the cocoon is an easy means of specific identification, as well as to enhance classification. Insect Architecture supplies us with a correct history of Hymenopterous and Dipterous parasites. Its study makes us better acquainted with the destructive insects, and gives us a knowledge wherewith we can check their progress. The collector will also devote a space in the cabinet to spider architecture. They are the most ingenious structures, many of them, mathematically speaking, surpasses any form produced by true insects.

Two cases 18 by 24 inches will suffice to hold a large number of specimens. One should be 2½ inches deep, to contain small forms, and the other 6 inches, for larger ones. To have a glass frame on hinges,—the frame to fit into the case when closed; this is to prevent the escape of small parasitic Hymenoptera &c., which may from day to day appear. Mount the specimens on colored cards, that they may be better exhibited,—write remarks &c., relating thereto on the card, and with strong pins place it in the cabinet.

Remarks on Tent-building Ants.

BY WILLIAM COUPER,

Assistant Secretary of the Literary and Historical Society, Quebec, &c.

An Ant occurs on the Homewood estate, near Toronto, U. Canada, that constructs a kind of *papier mâché* tent over *Aphides*, parasitic on a species of Alder. This structure is attached to the smaller branches of the tree, generally about two or three feet from the ground. The material used by the Ants appears to be fine dust fallen from the interior of decayed hard-wood trees. They convert the dust into a sort of paste which is carried up in small particles. It is wonderful to notice the steadiness and rapidity of these little architects about their work. During the cooler portions of sunny days, the whole working force (*neuters*) of the nest are out at labor, running up and down on the main trunk of the shrub on which the Aphides are living. Each ant on its upward course, having a small particle of the ready-made building material in its mandibles, which it adds to the structure, and the work is continued daily until the extent of the colony of Aphides is under cover. The form of structure altogether depends on the position of the Aphides. It is sufficiently open interiorly to give the ants and plant-parasites plenty of room and ventilation, and there are also several holes leading from underneath the tent for the passage of the ants. I am led to mark this form of Insect Architecture as heretofore unnoticed in America, and although sufficiently familiar with the structure, the species, which is black, and about four lines long, is unknown to me. Could not a correspondent of the Society at Toronto, procure the insect, and its architecture? The locality is mentioned and the objects can be found during the month's of June, July and August. Kirby, in his Introduction to Entomology, Vol. 1. p. 480, mentions the European *F. aethiops* and *F. flava*, as using "sawdust in forming their buildings", but does not speak of the structure in connection with other insects. In Vol. II, p. 89, he says: "sometimes to rescue them from their rivals, they take their aphides* in their mouth, they generally keep guard round them, and when the branch is conveniently situated, they have recourse to an expedient still more effectual to keep off interlopers,—they inclose it in a tube of earth or other materials, and thus confine them in a kind of paddock near their nest, and often communicating with it".

* The ant ascends the tree, says Linné, *that it may milk its cows, the Aphides*, not kill them. Syst. Nat. 962, 3.

This structure made over the Aphides is not the ants nest, but the property of the laboring portion of the colony, which are at a short distance in the earth. Against foes, it is guarded in daytime with more attention than soldiers guard the gates of a military city; and should an ant, even be it of the same species, from a neighboring nest, attempt to visit their "milk cows", it is pounced on and tumbled to the earth. Kirby says: "severe as this constant and unremitted daily labor seems, it is but a small part of what the affection of the working ants leads them readily to undertake. The *feeding* of the young brood, which rests solely upon them, is a more serious charge. The nest is constantly stored with larvæ the year round, during all which time, except in winter when the whole society is torpid, they require feeding several times a day with a viscid half-digested fluid that the workers disgorge into their mouths, which when hungry they stretch out to meet those of their nurses".

To advance our knowledge of insects is the object of Entomological Societies, but in some classes such cannot be perfected without attention to their architecture. Through it European Entomologists have made progress. The London Society possess a Cabinet of Insect Architecture, as is seen from the following,—"Prof. Westwood also exhibited numerous specimens of leaves which had been mined by larvæ of Diptera and Lepidoptera, arranged on card-board for the Cabinet, in such manner as to exhibit at a glance the difference between the various mines—a matter of considerable importance for the determination of the species".— *Athenæum*, Nov. 1. 1862.